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Indian Standard

POLYETHYLENE FLEXIBLE POUCHES FOR THE PACKING OF NATURAL MINERAL WATER AND PACKAGED DRINKING WATER — SPECIFICATION

(First Reprint AUGUST 2005)

ICS 13.060.20; 55.100; 83.140.01

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NEW DELHI 110002

August 2005 **Price Group 4**

Plastics Containers Sectional Committee, PCD 21

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastics Containers Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Government of India vide gazette notifications GSR 759(E) and GSR 760(E) dated September 29, 2000 has brought packaged natural mineral water and packaged drinking water under mandatory certification. In view of the Government notifications, the Plastics Containers Sectional Committee, decided to formulate National Standards on plastic packaging of packaged natural mineral water and drinking water.

In pursuance to this, IS 15410 : 2003 'Plastics bottles/containers for packaging of packaged natural mineral water and packaged drinking water — Specification' was published. The scope of IS 15410 : 2003 covers the requirement for raw materials, dimensional, performance requirements and method of test for plastic containers except flexible pouches, for packing of natural mineral water and packaged drinking water.

The Code of practice for handling of flexible pouches is currently under preparation by Food and Agriculture Department.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

POLYETHYLENE FLEXIBLE POUCHES FOR THE PACKING OF NATURAL MINERAL WATER AND PACKAGED DRINKING WATER — SPECIFICATION

1 SCOPE

This standard covers the requirements for raw materials, capacity and performance requirements, methods of tests and sampling for flexible pouches made from co-extruded polyethylene film for packing natural mineral water (*see* IS 13428) and packaged drinking water (*see* IS 14543) in net quantities of 200, 250, 300 and 500 ml.

2 REFERENCES

The following standards contain provisions which through reference in this text constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

IS No.	*Title*
2508 : 1984	Specification for low density polyethylene films (*second revision*)
2828 : 2001	Plastics — Vocabulary (*first revision*)
3025	Methods of sampling and test (physical and chemical)for water and wastewater:
(Part 5) : 1983	Odour (*first revision*)
(Part 8) : 1984	Taste rating (*first revision*)
4905 : 1968	Methods for random sampling
7019 : 1998	Glossary of terms in plastics and flexible packaging, excluding paper (*second revision*)
7028 (Part 2) : 2002	Performance tests for complete, filled transport packages: Part 2 Vibration test at fixed low frequency (*second revision*)
9845 : 1998	Determination of overall migration of constituents of plastics materials and articles intended to come in contact with foodstuffs — Method of analysis (*second revision*)
10141 : 2001	Positive list of constituents of polyethylene in contact with foodstuffs, pharmaceuticals and drinking water (*first revision*)
10146 : 1982	Polyethylene for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
13428 : 1998	Packaged natural mineral water (*first revision*)
14500 : 1998	Linear low density polyethylene (LLDPE) films
14535 : 1998	Recycled plastics for the manufacturing of products — Designation
14543 : 2004	Packaged drinking water (other than packaged natural mineral water) — Specification (*first revision*)
15495 : 2004	Printing ink for food packaging — Code of practice

3 TERMINOLOGY

3.1 For the purpose of this standard, definitions given in IS 2828 and IS 7019 and the following shall apply.

3.2 Type Tests for Film — Tests carried out to prove conformity with the requirements of **6** of this standard. These are intended to prove the general qualities and design of flexible co-extruded polyethylene film.

3.3 Acceptance Tests for Film — Tests carried out on samples selected from a lot for the purpose of verifying the acceptability of the lot.

4 TESTS

4.1 Classification of Tests for Polyethylene Films

4.1.1 *Type Tests*

The following shall constitute type (product approval) tests:

a) Description (*see* **6.1.1**),
b) Film form (*see* **6.1.2**),
c) Winding of the film (*see* **6.1.3**),
d) Odour (*see* **6.1.4**),
e) Thickness of film (*see* **6.1.5**),

f) Width (*see* **6.1.6**),
g) Overall migration (*see* **6.1.7**),
h) Tensile strength (*see* **6.1.8**),
j) Elongation at break (*see* **6.1.9**), and
k) Dart impact strength (*see* **6.1.10**).

4.1.1.1 The procedure for type/product approval for polyethylene films is given in Annex A.

4.1.2 *Acceptance Tests*

The following shall constitute the acceptance (product identification) tests:

a) Description (*see* **6.1.1**),
b) Film form (*see* **6.1.2**),
c) Winding of the film (*see* **6.1.3**),
d) Odour (*see* **6.1.4**),
e) Thickness of film (*see* **6.1.5**), and
f) Width (*see* **6.1.6**).

4.1.2.1 The lot shall be accepted, if the co-extruded polyethylene film are found to comply with requirements of acceptance tests given in **4.1.2**.

4.1.2.2 A recommended sampling plan and acceptance criteria are given in Annex B.

4.2 Tests for Flexible Pouches

a) Vibration leakage test (*see* **7.1**),
b) Water potability test (*see* **7.2**),
c) Stack load test (*see* **7.3**),
d) Drop test (*see* **7.4**),
e) Ink adhesion test (*see* **7.5**), and
f) Product resistance test (*see* **7.6**).

4.2.1 The lot of flexible pouches shall be accepted, if the samples selected from the lot are found to comply with requirements given in **4.2**.

4.2.2 A recommended sampling plan and criteria for conformity of the pouches is given in Annex C.

5 MATERIAL

The pouches shall be made from virgin colorless polyethylene [LDPE (*see* IS 2508), LLDPE (*see* IS 14500) or a blend thereof] co-extruded film meeting the food grade requirements given in IS 10141 and IS 10146.

6 REQUIREMENTS

6.1 Requirements for Polyethylene Films

6.1.1 *Description*

The films shall be transparent uniform in texture, finish, free from pin-holes, streaks, tears, blisters, particles of foreign matter, gauge variation bands and undispersed raw material. There shall be no other visible defect. The film shall show no impression of handling on the surface of the film. The film shall have even and wrinkle-free surface.

6.1.2 *Film Form*

The film shall be supplied in rolls packed to protect from any extraneous dust hazards. The length and weight of rolls shall be as agreed to between the buyers and the suppliers.

6.1.3 *Winding of Film*

The film shall be wound on the core, uniformly and with proper tension, giving a perfect and trimmed edge. There shall be no telescoping of film layers. The core shall be strong enough not to collapse in use and shall be made from properly compressed paper or plastics tube with smooth surface.

6.1.4 *Odour*

The film shall be free from any extraneous odour.

6.1.5 *Thickness*

6.1.5.1 The thickness of co-extruded polyethylene film shall be as follows:

a) 65 ± 5 micron for pouch sizes 200, 250 and 300 ml.
b) 75 ± 5 micron for pouch size 500 ml.

The overall thickness shall be checked according to method given in **A-2** of IS 2508.

6.1.6 *Width*

The width of the film shall be specified by the purchaser and shall be within $^{+2}_{-0}$ mm of the specified value.

6.1.7 *Overall Migration*

Representative samples of pouch shall be subjected to overall migration test with distilled water at 40 ± 2°C for 10 days either by filling the whole pouch or by using sheets cut from the pouch; in the latter case the migration value has to be extrapolated to the pouch contact surface area and the volume of the contents. The maximum extraction values for the pouch material shall not exceed 10 mg/dm^2 or 60 mg/l when tested as prescribed in IS 9845.

6.1.8 *Tensile Strength*

The tensile strength at break when tested as prescribed in **A-4** of IS 2508 for all polyethylene films shall be not less than 20 MPa (200 kgf/cm^2) in lengthwise direction and 18 MPa (180 kgf/cm^2) in crosswise direction.

6.1.9 *Elongation at Break*

The elongation at break when tested as prescribed in **A-4** of IS 2508 for co-extruded polyethylene film, shall be not less than 500 percent in both the directions.

6.1.10 *Dart Impact Resistance*

The impact failure load of polyethylene film when tested by the procedure given in **A-6** of IS 2508 obtained from a drop height of 66 cm shall be not less than the values given below:

Thickness of Film (micron)	*Impact Failure Load, Min* N (gf)
65	1.90 (190)
75	2.20 (220)

7 REQUIREMENTS FOR FLEXIBLE POUCHES

7.1 Vibration Leakage Test

The flexible packaging material shall be formed into pouches, filled and sealed as in the actual filling and sealing process. The filled pouches shall be subjected to vibration test as given in Annex D.

7.2 Water Potability Test

Natural mineral water or drinking water stored in pouches for 30 days, shall not acquire any unpleasant odour or bitter taste when tested according to the method prescribed in Annex E.

7.3 Stack Load Test

The pouches when subjected to a uniformly distributed stack load for 24 h shall not show any leakage at the seam or bursting of the film. The details of stack loads and the test method are given in Annex F.

7.4 Drop Test

The filled pouches shall be subjected to a vertical drop test at ambient condition, as detailed in Annex G and shall meet the acceptance criteria therein.

7.5 Ink Adhesion Test for Printed Pouch

The printed matter on the filled pouch when tested in accordance with the method given in Annex H shall be still legible.

7.6 Product Resistance Test for Printed Pouch

The printed matter on the pouch when tested in accordance with the method given in Annex J shall be still legible.

8 CONSTRUCTION

The pouches shall be formed, filled and sealed on the form, fill and sealing machine, leaving adequate head space in the pouch for filling and sealing operation. The width and length of the pouch shall be according to the dimensions of the forming and sealing system.

9 PACKING AND MARKING

9.1 Flexible Pouches

Pouches shall be printed neat, clean, legible and marked as per **7.1** of IS 14543 and recycling symbol in line with IS 14535.

Reference shall be made to IS 15495 for printing ink to be used and it shall be permissible under PFA Rules.

9.2 The filled pouches shall be supplied in secondary packaging as agreed to between the buyer and the seller.

9.2.1 Each packing indicated in **9.2** shall be marked with the following information:

a) Indication of the source of manufacture of pouch,
b) Number of pouches of 200/250/300/500 ml, and
c) Brand name, if any.

10 BIS CERTIFICTION MARKING

10.1 The pouches may also be marked with the Standard Mark.

10.1.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Clause* 4.1.1.1)

PROCEDURE FOR TYPE/PRODUCT APPROVAL FOR POLYETHYLENE FILMS

A-1 The polyethylene film shall be approved for type tests, if it conforms to the requirements of tests given in **6**.

A-2 Polyethylene film being procured, shall be firstly checked for physical characteristics like description, thickness, odour, width, film form and winding of the film. The polyethylene film successfully passing these tests shall then be tested for overall migration, tensile strength, elongation test and dart impact strength test to check the suitability and required strength of the polyethylene film for making pouches. The polyethylene film shall pass all these tests.

ANNEX B

(*Clause* 4.1.2.2)

SCALE OF SAMPLING AND ACCEPTANCE CRITERIA FOR POLYETHYLENE FILM

B-1 SAMPLING

B-1.1 Lot

All the rolls of polyethylene film of the same size and batch supplied at a time shall be grouped together to constitute a lot.

B-1.2 The sample size (number of polyethylene rolls to be sampled from each lot) is given in Table 1. The samples shall be drawn at random (*see* IS 4905).

B-1.3 Number of Tests and Criteria for Conformity

The specimen from each of the rolls selected in the sample, as given in col 2 of Table 1, shall be used for testing the various requirements given in **6.1.1** to **6.1.6**. A sample failing to meet any of these requirements shall be termed as defective. The lot shall be considered as conforming to these requirements, if the number of defectives do not exceed the acceptance number given in col 3 of Table 1, otherwise not.

Table 1 Scale of Sampling

(*Clauses* B-1.2 *and* B-1.3)

Lot Size *N* (1)	Sample Size *n* (2)	Acceptance No. *a* (3)
Up to 500	20	1
501 to 1 200	32	1
1 201 to 3 200	50	2
3 201 to 10 000	80	3
10 001 and above	125	5

ANNEX C

(*Clause* 4.2.2)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY FOR POUCHES

C-1 SAMPLING

C-1.1 Lot

The polyethylene pouches of the same size and same batch of material produced under similar conditions of production shall be grouped together to constitute a lot.

C-1.2 The sample size (number of polyethylene pouches to be sampled from each lot) is given in Table 2. The samples shall be drawn at random (*see* IS 4905).

Table 2 Scale of Sampling

(*Clause* C-1.2)

Lot Size *N* (1)	Sample Size *n* (2)
Up to 3 200	5
3 201 to 10 000	8
10 001 and above	13

C-1.3 Number of Tests and Criteria for Conformity

The pouches as selected in the sample shall be tested for water potability, ink adhesion and product resistance. Any pouch failing to meet any one or more of these requirements shall be termed as defective. The lot shall be considered as conforming to these requirements, if no defective is found in the sample, otherwise the lot shall be rejected.

C-1.4 Sample size and criteria for conformity for vibration leakage test, stack load and drop test are given in Annexes D, F and G respectively.

ANNEX D

(*Clause* 7.1)

VIBRATION LEAKAGE TEST

D-1 VIBRATION TABLE

This shall be equipment conforming to IS 7028 (Part 2).

D-2 MODE OF PACKAGING

Pouches shall be packed in a plastic woven sack made from PP or HDPE or liners/bags.

D-3 TEST CONDITIONS

Test shall be carried out at ambient temperature with the pouches filled with natural mineral water or drinking water. In the case of dispute, the ambient temperature shall be 27 ± 2°C.

D-4 PROCEDURE

Four outer bags/boxes, containing the filled pouches, shall be kept on the vibration table and vibrated at a peak acceleration of slightly above 1 *g* (where *g* denotes acceleration due to gravity) for 30 min. After the test, the pouches are examined for apparent leaks and removed. The remaining are wiped, cleaned and placed flat on blotting paper on the vibration table at 2 Hz for 10 min and the pouches are examined for apparent leaks and counted and added to the leakers.

NOTE — Number of pouches in secondary packaging shall be as per industry practice.

D-5 CRITERIA FOR ACCEPTANCE AND RETESTING

The lot shall be considered passing this test, if not more than one pouch shows leakages in the test. The lot shall be rejected, if the number of failure pouches are 3 or more. In the event of leakage pouches are 2, a second sample of the same quantity as per **D-4** shall be taken and tested for vibration test. The lot shall be considered passing in the retest, if not more than one pouch in the second sample shows leakage, otherwise the lot is rejected.

ANNEX E

(*Clause* 7.2)

METHOD OF TEST FOR WATER POTABILITY

E-1 GENERAL

E-1.1 Odour of water, though very important, cannot be determined in absolute units. Olfactory sense, which is most sensitive means of detecting small concentration of odiferous substances is universally adopted in such cases.

E-1.2 Natural mineral water/packaged drinking water for testing shall be clear and fresh.

E-2 PROCEDURE

Heat the water to a temperature of 38 ± 2°C, and fill the pouches. Keep the pouches at 38 ± 2°C, for a period of 30 days. The pouches shall be opened after 30 days of storage period and the water shall be examined for any disagreeable odour or smell.

E-3 OBSERVATIONS

At the end of the 30 days, the water shall not give any unpleasant odour or taste, when tested as per IS 3025 (Part 5) and IS 3025 (Part 8) respectively.

ANNEX F

(*Clause* 7.3)

STACK LOAD TEST

F-1 PROCEDURE

Four pouches shall be selected. The pouches shall be subjected to a uniformly distributed load as given below for 24 h. The pouches shall lie in a flat position.

Pouch Capacity	*Stack Load*	
	One Pouch	Four Pouches
ml	N	N
(1)	(2)	(3)
200	20	80
250	30	120
300	40	160
500	50	200

The test may be carried out at ambient temperature with the pouches filled with natural mineral water or drinking water. In the case of dispute the ambient temperature shall be 27 ± 2°C.

The application of load shall be through a flat wooden plank which shall be placed on the pouches in such a way that the load distribution is equal on each pouch.

F-2 RESULT

On completion of the test, the pouches shall be examined for any leakage at the seam or bursting. No leakage or bursting is permitted.

ANNEX G

(*Clause* 7.4)

DROP TEST

G-1 SAMPLE SIZE

First sample as per Table 2.

G-2 METHOD

Each pouch in the sample shall be subjected to a flat drop from a height of 1.2 m at ambient temperature on a flat hard surface.

G-3 CRITERIA FOR ACCEPTANCE AND RETESTING

Each pouch shall be examined for any leakage of the contents and de-lamination after the test. If none of the pouches selected in the sample fails in the drop test, the lot shall be considered as passing. If the number of failures are more than one, the lot shall be rejected. If just one fails, a second sample of the same size as that of first sample shall be selected from the lot and tested in the same manner as above. If none of the pouches in the second sample fails, the lot shall be considered as passing, otherwise the lot shall be rejected.

ANNEX H

(*Clause* 7.5)

TEST FOR INK ADHESION OF PRINTED POUCHES

H-1 Apply two strips of 25 mm wide transparent pressure sensitive taps or cello-tape to the printed area of the pouch, one piece down the length of the pouch and the other along the width.

H-2 Press the tape firmly on to the pouch and leave for 15 s.

H-3 Remove the tape by pulling slowly at about 10 mm/s from one end at about 90° to the pouch surface.

H-4 There shall be no significant removal of the print from the surface of the pouch and the printed material shall be still legible.

ANNEX J

(*Clause* 7.6)

TEST FOR PRODUCT RESISTANCE OF PRINTED POUCHES

J-1 Leave the pouch to stand for at least 24 h after printing.

J-2 Partially immerse the pouch or its representative sections from the printed area, in the natural mineral water or drinking water intended to be packed into the pouch, at ambient temperature for 1 h.

Remove the pouch or representative sections from the product.

J-3 Rub representative section of pouch firmly with paper tissue 10 times.

J-4 There shall be no significant removal of the print from the surface of the pouch and the printed material shall be still legible.

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